The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A method of converting C_2 and/or higher alkanes to olefins, comprising contacting a feedstock containing C_2 and/or higher alkanes with a first surface of a metal composite membrane of a sintered homogenous mixture of a metal oxide ceramic powder and a metal powder of one or more of Pd, Nb, V, Zr, Ta and/or alloys or mixtures thereof, wherein the C_2 and/or higher alkanes dehydrogenate to olefins by contact with the first surface with hydrogen from the dehydrogenation of the alkanes passing through the metal composite membrane to a second surface, and separating the formed olefins from the first surface of the membrane while separating the hydrogen from the second surface.

2. The method of claim 1, wherein the feedstock contains ethane.

3. The method of claim 1, wherein the feedstock contains propane.

4. The method of claim 1, wherein the membrane contains Pd.

5. The method of claim 1, wherein the membrane contains a Pd-Ag alloy.

6. The method of claim 1, wherein the membrane contains a Pd-Ag alloy with Ag present in the range of from about 20 to about 25% by weight.

7. The method of claim 1, wherein the membrane contains a Pd-Ag alloy with Ag present at about 23% by weight.

8. The method of claim 1, wherein the membrane contains a Pd-Cu alloy.

9. The method of claim 1, wherein the membrane contains a Pd-Cu alloy with Cu present in the range of from about 30 to about 55 % by weight.

10. The method of claim 1, wherein the membrane contains a Pd-Cu alloy with Cu present at about 40% by weight.

11. The method of claim 1, wherein the metal oxide ceramic contains one or more of Al_2O_3, $BaTiO_3$, $SrTiO_3$, stabilized or partially stabilized ZrO_2.

12. The method of claim 1, wherein the metal oxide ceramic contains yittria stabilized ZrO_2.

13. The method of claim 1, wherein the metal oxide ceramic contains calcia stabilized ZrO_2 .

14. The method of claim 1, wherein the membrane is not less than about 95% of theoretical density.

15. The method of claim 1, wherein the membrane has a thickness in the range of from about 0.01 millimeters to about 5 millimeters.

16. The method of claim 1, wherein the membrane is in the form of a sheet or a tube or a honeycomb.

17. The method of claim 1, wherein the metal powder is present in the membrane in the range of from about 20 to about 60% by volume.

18. The method of claim 1, wherein the membrane is permeable to atomic hydrogen and has substantially no interconnected porosity.

19. A method of converting C_2 and/or higher alkanes to olefins, comprising contacting a feedstock containing C_2 and/or higher alkanes with a first surface of a metal composite membrane of a sintered homogenous mixture of an Al oxide or stabilized or partially stabilized Zr oxide ceramic powder and a metal powder of one or more of Pd, Nb, V, Zr, Ta and/or alloys or mixtures thereof, wherein the C_2 and/or

higher alkanes dehydrogenate to olefins by contact with the first surface with substantially only atomic hydrogen from the dehydrogenation of the alkanes passing through the metal composite membrane to a second surface, and separating the formed olefins from the first surface of the membrane while separating the hydrogen from the second surface.

20. The method of claim 19, wherein the feedstock contains ethane or propane.

21. The method of claim 19, wherein the membrane contains Pd.

22. The method of claim 19, wherein the membrane contains a Pd-Ag alloy.

23. The method of claim 19, wherein the membrane contains a Pd-Ag alloy with Ag present in the range of from about 20 to about 25% by weight.

24. The method of claim 19, wherein the membrane contains a Pd-Cu alloy.

25. The method of claim 19, wherein the membrane contains a Pd-Cu alloy with Cu present in the range of from about 30 to about 55 % by weight.

26. The method of claim 19, wherein the metal oxide ceramic contains calcia or yittria stabilized ZrO_2.

27. The method of claim 19, wherein the metal oxide ceramic contains yittria stabilized ZrO_2.

28. The method of claim 19, wherein the membrane is not less than about 95% of theoretical density.

29. The method of claim 19, wherein the membrane has a thickness in the range of from about 0.01 millimeters to about 5 millimeters and is permeable to atomic hydrogen with substantially no interconnected porosity.

30. An apparatus for converting C_2 and/or higher alkanes to olefins, comprising a supply of feedstock containing C_2 and/or higher alkanes, a metal composite membrane of a sintered homogenous mixture of a metal oxide ceramic powder and a metal powder of one or more of Pd, Nb, V, Zr, Ta and/or alloys or mixtures thereof, mechanism for contacting said feedstock with one side of said membrane wherein the C_2 and/or higher alkanes dehydrogenate to olefins by contact with said membrane with atomic hydrogen from the dehydrogenation of the alkanes passing through said membrane to another side thereof, and mechanism for separating the formed olefins from said one side of said membrane while separating atomic hydrogen from said other side.

31. The apparatus of claim 30, wherein said membrane contains Pd.

32. The apparatus of claim 31, wherein said membrane contains Pd and Ag or Cu.

33. The apparatus of claim 32, wherein said membrane has metal present in the range of from about 20 to about 60% by volume.

34. The apparatus of claim 33, wherein said membrane is atomic hydrogen permeable and has substantially no interconnected porosity and contains Al_2O_3 or ZrO_2 stabilized or partially stabilized with yittria or calcia.

35. The apparatus of claim 34, wherein said membrane is in the form of a sheet or a tube or a honeycomb.

36. The apparatus of claim 35, wherein the feedstock contains propane and the olefins contain propylene.

37. The apparatus of claim 36, wherein the feedstock contains ethane and the olefins contain ethylene.